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23 March 2012

Mr. Raymond Chavira
Remedial Project Manager
U.S. Environmental Protection Agency - Region 9
75 Hawthorne Street, SFD-7-3
San Francisco, California 94105

Re: Response to USEPA 19 March 2012 File and Data Request
Former TRW-Benchmark Site, City of Industry, CA

Dear Mr. Chavira:

This letter responds to your 19 March 2012 email to Orion Environmental (Orion) requesting additional historical information pertaining to the Former TRW-Benchmark Site. Please note that the attached information package addresses the following issues:

- Additional historic correspondence with the Regional Water Quality Control Board (RWQCB)
- Information regarding work plans for the 2002 cone penetration test, 2004 deep soil boring, and tracer studies
- 1991-1995 groundwater data for all Z4 series wells, including Z4-6
- Z4-6 groundwater data, well abandonment/decommission permit, and well survey log
- List of documents submitted to RWQCB that includes Z4 groundwater monitoring data
- Copy of the May 2003 semiannual groundwater monitoring report - dated November 2003

It is our goal that this information package addresses all of your requests outlined in your email to Orion. Please do not hesitate to let me know if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Joe Kwan', with a long horizontal flourish extending to the right.

Joseph P. Kwan
Corporate Director, Environmental Remediation
on behalf of Northrop Grumman Systems Corporation

Attachment

cc: Pete MacNicholl - DTSC



Orion Environmental Inc.
✓ 3450 E. Spring St., Suite 212 562 988-2755 PHONE
Long Beach, CA 90806 562 988-2759 FAX

DBA Arctos Environmental
○ 2703 7th Street, Mailbox 213 510 525-2180 PHONE
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Memorandum

To: Joseph Kwan, Northrop Grumman Corporation
Copy: Elizabeth Brown, Northrop Grumman Corporation
Linda Niemeyer, Northrop Grumman Corporation
Rick Lewis, Northrop Grumman Corporation
From: Matthew Nelson, Orion Environmental Inc.
Date: 23 March 2012
**Subject: Response to USEPA 19 March 2012 File and Data Request
Former TRW-Benchmark Site, City of Industry, California**

Orion Environmental Inc. (Orion) has prepared this memorandum to respond to a request from U.S. Environmental Protection Agency (USEPA) in a 19 March 2012 e-mail for project documents and data. The USEPA's requests are copied below in *italics*, followed by our responses.

Request 1: *Please update the list to include: (a) All historic correspondence with the RWQCB.*

Response: We understand this request to mean *"Provide an updated Project Document Index to include correspondence with the Regional Water Quality Control Board (RWQCB)."* All historical correspondence with the RWQCB found in the project files has been added to the Project Document Index which is included as Attachment A. The correspondence has also been uploaded to the Orion FTP website and mailed to USEPA via compact disc (CD) sent on 23 March 2012.

Request 2: *Please update the list to include: (b) Work plans for the 2002 CPT, 2004 DB soil, and tracer studies.*

Response: We understand this request to mean *"Provide work plans for the 2002 cone penetration test (CPT) investigation, the 2004 deep soil boring investigation, and the 2000 dye tracer test and include these documents in the Project Document Index."* As stated in Orion's 16 March 2012 memorandum titled "Summary Deep Source Investigations Conducted in 2002 and 2004," work plans were not prepared for the 2002 and 2004 investigations. This memorandum has been added to the Project Document Index. These data collection events have already been added to the Past Data Summary Table.

Similarly, no work plan was prepared for the 2000 dye tracer test. The results of the dye tracer test (among many other topics) were discussed in a memorandum entitled "Response to DTSC Data Request" memorandum that was prepared and submitted to the



California Department of Toxic Substances Control (DTSC) on 20 January 2012. This memorandum has been added to the Project Document Index. The dye tracer test data collection event will be added to the Past Data Summary Table. Finally, both the 16 March and 20 January 2012 memoranda have been uploaded to the Orion FTP website.

Request 3: *Please update the list to include: (c) 1991-1995 groundwater data for all the Z4 series wells; including Z4-6.*

Response: We understand this request to mean *"Add the groundwater data collection events for all Z4 series wells (including Z4-6) from the period of 1991-1995 into the Past Data Summary Table, include any reports discussing these data in the Project Document Index and upload the reports to the FTP website."* Orion has completed an exhaustive search of the historical files for Z4 well groundwater sampling data from 1991 to 1995 and has not located any analytical or field reports before November 1995. In addition to reviewing Orion's historical file, Orion reviewed the 10 boxes of documents from Northrop Grumman's archived project file, which includes TRW Inc.'s historical files. Orion also reviewed the five boxes of documents contained in the archived project files of URS Corporation, the company that acquired Woodward-Clyde Consultants (Woodward-Clyde), which was the project consultant before 1996.

The Z4 wells were installed in June and August of 1991 as part of an insitu soil vapor extraction (SVE) system (Woodward-Clyde, 1992). Depth to groundwater in August 1991 was measured at approximately 52 and 48 feet below ground surface (bgs) at wells W8 and W9, respectively, both completed to a depth of 60 feet bgs. Wells Z4-1 through Z4-5 were screened below the water table to depths of 65 or 70 bgs in anticipation of supplementing the SVE system during future water table drawdown from a planned groundwater extraction system.

In July 1993, the groundwater level had risen approximately 10 to 12 feet to approximately 38 feet bgs at wells W8 and W9. Based on the increase in water levels, the Z4 wells were included in aquifer and pilot tests conducted in 1993 for preparation of the groundwater remedial action plan (Woodward-Clyde, 1994). Because the Z4 wells were installed as vapor extraction wells, it was unlikely the Z4 wells were included in any groundwater monitoring conducted before 1993.

However, a table in a 1993 Request for Bid (RFB) for Groundwater Extraction and Treatment Equipment shows groundwater volatile organic compound (VOC) concentrations for wells Z4-1 through Z4-5 (Woodward-Clyde, 1993). Although the concentrations are described in Table 1 of the RFB (Attachment B) as being the "Maximum VOC Concentrations Present in Groundwater Based on Laboratory Analysis Using EPA Method 601," these concentrations do not appear to represent actual groundwater concentrations from any specific sampling event, but instead are anticipated maximum concentrations that were assumed for design purposes. As previously stated, Orion can



find no data to support the values in the table for the Z4 wells, and there does not appear to be any correlation between concentrations listed in Table 1 for wells W3, W7, W8, W9, and W10 and historical groundwater concentrations reported for these wells from the time of installation through 1993. It should be noted that Orion reproduced Table 1 (Attachment C) for the Interim Status Report 1992-1996 (Orion, 1997) and, in so doing, inadvertently inserted an order of magnitude error for the tetrachloroethene value for well Z4-4 (6,000 micrograms per liter [$\mu\text{g/l}$] versus 600 $\mu\text{g/l}$ in the Woodward-Clyde table).

As explained above, Orion has been unable to locate any analytical data or field reports that indicate groundwater was sampled from the Z4 wells before November 1995. Therefore, no data has been added to the Past Data Summary Table. We have added the Woodward-Clyde 1993 Request for Bid for Groundwater Extraction and Treatment Equipment document to the Project Document Index and a copy has been uploaded to the Orion FTP website.

Request 4: *Please update the list to include: (d) Copy of all Z4-6 groundwater data, copy of the well abandonment/decommission permit for Z4-6 well, survey log for the Z4-6 well.*

Response: We understand this request to mean “Please provide (1) a copy of all well Z4-6 groundwater data, (2) a copy of the well abandonment/decommissioning permit for well Z4-6, and (3) the survey log for well Z4-6, and as appropriate add the data to the Past Data Summary Table and list any reports in the Project Document Index.” During the site walk with Northrop Grumman, USEPA, and DTSC on 8 March 2012, Orion misspoke when saying that well Z4-6 may have been abandoned. Well Z4-6 has not been abandoned/decommissioned. The wellhead for well Z4-6 was buried roughly 7 to 8 feet below grade when the SVE system was constructed in 1991, as described in Section 7.3.2 of the Woodward-Clyde Soil Investigations and Remediation report dated 25 September 1992 (Woodward-Clyde, 1992). The wellhead for well Z4-6, along with nine other vapor extraction wells, was buried because plans were in place to construct a building with a proposed footprint that would cover these wells. Because well Z4-6 was an SVE well and the wellhead was buried, it was never sampled for groundwater.

The survey log for well Z4-6 cannot be located in the historical project file. Therefore we are not providing any copies of any documents and we are not making any updates to the Past Data Summary Table or the Project Document Index as a result of this request.

Request 5: *Please update the list to include: (e) List of documents submitted to the RWQCB which include the Z4- groundwater monitoring data.*

Response: We understand this request to mean “Provide a list of documents submitted to the RWQCB which include the Z4 groundwater monitoring data and if those documents are not in the Project Document Index, add them.” A list of documents that include Z4 well groundwater monitoring data is in Attachment D. These documents are already



included in the Project Document Index and the data are in the Data Summary Table, so no changes to those documents were made as a result of this request.

Request 6: *Please update the list to include: (f) Copy of the May 2003 Semiannual Groundwater Event (dated November 2003).*

Response: We understand this request to mean *"Provide a copy of the May 2003 Semiannual Groundwater Event (dated November 2003) and add the data to the Past Data Summary Table and list the report in the Project Document Index."* A copy of the Groundwater Monitoring Report for the May 2003 semiannual event was submitted to USEPA in an e-mail from Orion dated 20 March 2012. This report, along with additional reports located since the project report submittal on 29 February 2012, has also been uploaded to the Orion FTP website and mailed to USEPA via CD sent on 23 March 2012. All reports uploaded to the Orion FTP website on 23 March 2012 have also been added to the Project Document Index and their data, if any, have been added to the Past Data Summary Table.

Attachments

- Attachment A – Project Document Index (Chronological Order)
- Attachment B – Table 1 from 1993 Request for Bid for Groundwater Extraction and Treatment Equipment
- Attachment C – Table 9 from Interim Status Report 1992-1996
- Attachment D – Reports Describing Z4 Well Groundwater Monitoring Data

References

Orion Environmental Inc., 1997. "Interim Status Report 1992-1996, TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 30 December.

Woodward-Clyde Consultants, 1992. "Soil Investigations and Remediation Conducted at Benchmark Technology Site, City of Industry, California, Volume 1 of 2 Text and Appendix A and B," prepared for TRW Inc., 25 September.

Woodward-Clyde Consultants, 1993. "Request for Bid for Groundwater Extraction and Treatment Equipment, Former Benchmark Facility, City of Industry, California," 9 December.

Woodward-Clyde Consultants, 1994. "Groundwater Remedial Action Plan, Benchmark Facility, City of Industry, California," prepared for TRW Inc., 4 April.

ATTACHMENT A

PROJECT DOCUMENT INDEX (CHRONOLOGICAL ORDER)

PROJECT DOCUMENT INDEX (CHRONOLOGICAL ORDER)⁽¹⁾
SHALLOW ZONE SOUTH OF PUENTE CREEK
FORMER TRW BENCHMARK SITE

California Regional Water Quality Control Board, Los Angeles Region, 1986a. Letter from Raymond K. Delacourt to Jerry Hall (Benchmark Technology), "Subsurface Investigation (File No. 86-22)," 13 June.

California Regional Water Quality Control Board, Los Angeles Region, 1986b. Letter from Raymond K. Delacourt to Ed Nelson (Benchmark Technology), "Subsurface Investigation (File No. 86-22)," 2 July.

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Woodward-Clyde Consultants, 1988a. "Phase II Soil and Groundwater Investigation, Benchmark Technology Facility, City of Industry, California," prepared for Benchmark Technology, 12 January.

Woodward-Clyde Consultants, 1988b. "Work Plan, Phase III Soil and Ground Water Investigation, Benchmark Technology Facility, City of Industry, California," prepared for Benchmark Technology, 2 February.

Woodward-Clyde Consultants, 1988c. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Response to RWQCB Review of Phase III Work Plan, Benchmark Technology (File No. 86-22)," 26 February.

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Woodward-Clyde Consultants, 1988e. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Approval of Phase III Work Plan and Addendum, Soil and Groundwater Investigation, Benchmark Technology (File No. 86-22)," 18 May.

California Regional Water Quality Control Board, Los Angeles Region, 1988b. Letter from Roy R. Sakaida to Richard Barkley (Benchmark Technology), "Continued Site Assessment – Benchmark Technology (File No. 86-22)," 20 June.

Woodward-Clyde Consultants, 1988f. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Conditional Approval of Proposed Work Plan, Phase III Soil and Ground Water Investigation, Benchmark Technology (File No. 86-22), City of Industry, California," 19 July.

Woodward-Clyde Consultants, 1988g. "Work Plan, Chromium Reduction Sump Closure at Benchmark Technology, City of Industry, California," prepared for Benchmark Technology, Inc., 26 September.

Woodward-Clyde Consultants, 1988h. "Phase III Soil and Groundwater Investigation, Benchmark Technology Facility, City of Industry, California, Report and Appendix A-C," prepared for Hufstedler, Miller, Kaus and Beardsley, 19 December.

Woodward-Clyde Consultants, 1988i. "Phase III Soil and Groundwater Investigation, Benchmark Technology Facility, Appendix D, Lab Reports, City of Industry, California, Appendix D and Lab Reports," prepared for Hufstedler, Miller, Kaus and Beardsley, 19 December.

Woodward-Clyde Consultants, 1989a. "Hazardous Materials Records Review, Benchmark Technology Site Vicinity, 200 South Turnbull Canyon Road, City of Industry, California," 1 February.

Woodward-Clyde Consultants, 1989b. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Soil Disposal Requests, Soil and Ground Water Investigation, Benchmark Technology Facility," 31 March.

California Regional Water Quality Control Board, Los Angeles Region, 1989a. Letter from Robert P. Ghirelli to Robert M. Walter (TRW Inc.), "Cleanup and Abatement Order No. 89-034," 12 April.

Woodward-Clyde Consultants, 1989c. "Phase IV Work Plan, Ground Water Investigation, Benchmark Technology Facility, City of Industry, California," prepared for Hufstedler, Miller, Kaus & Beardsley, 26 April.

Woodward-Clyde Consultants, 1989d. Letter from Jay D. White to Philip Chandler (RWQCB), "Cleanup and Abatement Order No. 89-034, Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California (RWQCB File No. 86-22)," 26 May.

California Regional Water Quality Control Board, Los Angeles Region, 1989b. Letter from Roy R. Sakaida to Richard M. Barkley (Benchmark Technology), "Site Assessment/Ground Water Investigation – Benchmark Technology Facility, City of Industry (CAO 89-034; File No. 86-22)," 27 June.

Woodward-Clyde Consultants, 1989e. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Cleanup and Abatement Order No. 89-034, Request for Extension, Benchmark Technology Facility, City of Industry, California," 12 July.

Woodward-Clyde Consultants, 1989f. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Request for Extension, Revised Phase IV Work Plan, Benchmark Technology Facility, City of Industry, California," 14 July.

Woodward-Clyde Consultants, 1989g. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Results of Ground Water Monitoring, Benchmark Technology Facility, City of Industry, California," 18 July.

Woodward-Clyde Consultants, 1989h. Letter from James D. Hartley to Hank Yacoub and Philip Chandler (RWQCB), regarding meeting to discuss site remediation, 26 July.

Woodward-Clyde Consultants, 1989i. "Work Plan Revisions, Phase IV Ground Water Investigation, Benchmark Technology Facility, City of Industry, California," 3 August.

Woodward-Clyde Consultants, 1989j. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Cleanup and Abatement Order No. 89-034, Request for Extensions, Benchmark Technology Facility, City of Industry, California," 5 September.

California Regional Water Quality Control Board, Los Angeles Region, 1989c. Letter from Roy R. Sakaida to Frank D. Hintze (Benchmark Technology), "Site Assessment – Benchmark Technology Facility, City of Industry (CAO 89-034; File No. 86-22)," 12 September.

Woodward-Clyde Consultants, 1989k. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Cleanup and Abatement Order No. 89-034, Request for Off-Site Work Plan Extension, Benchmark Technology Facility, City of Industry, California," 12 October.

Woodward-Clyde Consultants, 1989l. "Work Plan, Off-Site Ground Water Investigation, Benchmark Technology Facility, City of Industry, California," prepared for Benchmark Holding Group and TRW Inc., 27 October.

Woodward-Clyde Consultants, 1989m. Letter from Linda A. Metcalf to Philip Chandler (RWQCB), "Request for Soil Disposal Approval, Benchmark Technology Facility, City of Industry, California," 2 November.

The Koll Company, 1989. Letter from Peter C. Tilton to Philip Chandler (RWQCB), regarding purchase of the Benchmark Technology site, 17 November.

Woodward-Clyde Consultants, 1989n. Letter from Jay D. White to Phil Chandler (RWQCB), "Soil Remediation Activities, Benchmark Technology Facility, City of Industry, California," 14 December.

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California Regional Water Quality Control Board, Los Angeles Region, 1990. Letter from Roy R. Sakaida to Frank Hintze (Benchmark Holding Group) and Joseph Kwan (TRW Inc.), "Site Remediation – Benchmark Technology Facility, City of Industry (CAO 89-034; File No. 86-22)," 22 January.

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Woodward-Clyde Consultants, 1990d. "Soil Cleanup Levels for the Benchmark Facility," prepared for TRW Inc., 27 June.

Riedel Environmental Services, Inc., 1990. "Demolition/Decontamination, Benchmark Technology Facility, Health and Safety Plan," October.

Woodward-Clyde Consultants, 1990e. "Health and Safety Plan for the Benchmark Remedial Action Program, City of Industry, California," prepared for TRW, 1 October.

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Woodward-Clyde Consultants, 1990g. "Summary of Preliminary Vapor Extraction System Design, Benchmark Technology Facility, City of Industry, California," prepared for TRW Inc., 26 November.

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Northrop Grumman Corporation, 2009c. Letter from Joseph P. Kwan to Cassandra Owens (RWQCB), "Response to NPDES Administrative Extension and Facility Inspection, Former TRW Benchmark Site, 200 Turnbull Canyon Road, City of Industry, NPDES No. CA0064114, CI No. 7531," 10 November.

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Northrop Grumman Systems Corporation, 2010c. Letter from Joseph P. Kwan to Tracy Egoscue (RWQCB), "Proposed Lead Agency Transfer - Former TRW Benchmark Site, 200 South Turnbull Canyon Road, City of Industry, California, CAO No. 89-034, WIP No. 102.0007, Site ID 2040124," 18 March.

California Regional Water Quality Control Board, Los Angeles Region, 2010b. Letter from Samuel Unger to Joseph Kwan (Northrop Grumman Corporation), "Lead Agency Transfer Implemented – Former TRW, Inc./Benchmark Technology Facility, 200 Turnbull Canyon Road, City of Industry, California, 91748 (CAO No. 89-034, WIP No. 102.0007, Site ID 204124)," 19 May.

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CDM, 2011. "Draft Remedial Design/Remedial Action Work Plan, Shallow Zone South of Puente Creek Remedy," prepared for Northrop Grumman Systems Corporation, 16 November.

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Orion Environmental Inc., 2012b. "Summary Deep Source Investigations Conducted in 2002 and 2004, Former TRW Benchmark Site, City of Industry, California," prepared for Northrop Grumman Corporation, 16 March.

Abbreviations:

CAO – Cleanup and Abatement Order

CAP – Corrective Action Plan

NPDES – National Pollutant Discharge Elimination System

RAP – Remedial Action Plan

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RWQCB – California Regional Water Quality Control Board, Los Angeles Region

USEPA – United States Environmental Protection Agency

VES – Vapor Extraction System

ATTACHMENT B

TABLE 1 FROM 1993 REQUEST FOR BID FOR GROUNDWATER EXTRACTION AND TREATMENT EQUIPMENT

TABLE 1

**TRW - BENCHMARK
GROUNDWATER AND EXTRACTION TREATMENT SYSTEM CRITERIA**

Well No. (Well Diameter in inches)	Maximum Flow Rate (gpm) ^(a)	Total Well Depth (feet)	Depth to Water (feet) ^(b)	Approximate Distance from Wellhead to Treatment Area (feet)	Total Hydraulic Head (feet) ^(c)	Maximum VOC Concentrations Present in Groundwater Based on Laboratory Analysis Using EPA Method 601 (µg/l)				
						1,1-DCA	1,1-DCE	1,1,1-TCA	TCE	PCE
Z4-1 (2)	3.5	65	35.54	160	94	2,500	27,300	30,600	8,049	3,800
Z4-2 (2)	2.5	65	36.43	220	94	1,900	30,300	20,000	8,100	1,900
Z4-3 (2)	2	65	36.06	310	94	1,300	25,500	10,400	8,100	1,300
Z4-4 (2)	1.5	58	35.21	445	86	600	26,900	1,500	7,100	600
Z4-5 (2)	9	70	35.48	540	107	500	15,900	1,500	5,600	500
W-3 (4)	3.5	55	36.38	730	84	500	7,600	28,900	1,300	500
W-7 (4)	4	60	39.04	190	89	800	7,100	27,600	400	100
W-8 (4)	4	60	36.53	105	89	1,900	17,100	38,200	2,700	300
W-9 (4)	4	60	36.04	400	90	400	14,000	600	4,444	300
W-10 (4)	6	60	37.12	290	94	80	1,300	1,000	1,006	100
Total Maximum Influent Concentrations @ Maximum Flowrates						900	14,800	14,100	4,200	800
Maximum Permissible Effluent Concentrations						3	4	20	3	3
Minimum Removal Efficiency Required						99.67%	99.97%	98.86%	99.93%	99.63%

TABLE 1 (CONTINUED)

NOTES:

- (a) The maximum flow rate was calculated based on the results of pump tests conducted during November 15-17, 1993. The total system flow shall not exceed 40 gpm (in accordance with an NPDES permit).
- (b) Depth to water was measured during November 15-17, 1993.
- (c) Total hydraulic head is the head loss in the water line from the bottom of the well to the Treatment Area (assuming a 1-inch-diameter hose from the pump to the wellhead and 1 ½-inch-diameter PVC pipe from the wellhead to the Treatment Area).

Table from Request for Bid for Groundwater Extraction and Treatment Equipment, dated 9 December 1993.

ATTACHMENT C

TABLE 9 FROM INTERIM STATUS REPORT 1992-1996

TABLE 9
GROUNDWATER REMEDIATION SYSTEM DESIGN CRITERIA

Well Number	Casing Diameter (inches)	Predicted Maximum Flow Rate ^(b) (gpm)	Well Depth (feet bgs)	Depth to Water ^(c) (feet bgs)	Distance from Wellhead to Treatment Area (approx. feet)	Total Hydraulic Head ^(d) (feet)	Maximum VOC Concentrations Present in Groundwater ^(a)				
							1,1-DCA	1,1-DCE	1,1,1-TCA	TCE	PCE
W3	4	3.5	55	36.38	730	84	500	7,600	28,900	1,300	500
W7	4	4	60	39.04	190	89	800	7,100	27,600	400	100
W8	4	4	60	36.53	105	89	1,900	17,100	38,200	2,700	300
W9	4	4	60	36.04	400	90	400	14,000	600	4,444	300
W10	4	6	60	37.12	290	94	80	1,300	1,000	1,006	100
Z4-1	2	3.5	65	35.54	160	94	2,500	27,300	30,600	8,049	3,800
Z4-2	2	2.5	65	36.43	220	94	1,900	30,300	20,000	8,100	1,900
Z4-3	2	2	64.5	36.06	310	94	1,300	25,500	10,400	8,100	1,300
Z4-4	2	1.5	63	35.21	445	86	600	26,900	1,500	7,100	6,000
Z4-5	2	9	70	35.48	540	107	500	15,900	1,500	5,600	500
Total Maximum Influent Concentrations at Maximum Flow Rates (µg/l)							900	14,800	14,100	4,200	800
Maximum Permissible Effluent Concentrations (µg/l)							3	4	20	3	3
Minimum Removal Efficiency Required (percent)							99.67	99.97	98.86	99.93	99.63

(a) Based on laboratory analyses from 1990 through 1993 using EPA Method 601; quantities in micrograms per liter. Compounds are abbreviated as follows:

1,1-DCA 1,1-Dichloroethane
1,1-DCE 1,1-Dichloroethene
1,1,1-TCA 1,1,1-Trichloroethane
TCE Trichloroethene
PCE Tetrachloroethene

(b) Maximum flow rate was estimated based on the results of recovery tests conducted in November 1993. The total system flow was estimated to be approximately 40 gallons per minute (gpm).

(c) Depth to water was measured before the recovery tests conducted in November 1993.

(d) Total hydraulic head is the head loss in the water line from the bottom of the well to the Treatment Area (assuming a 1-inch-diameter hose from pump to wellhead and a 1-1/2-inch-diameter PVC pipe from wellhead to Treatment Area).

Table from Interim Status Report 1992 through 1996, dated 30 December 1997.

ATTACHMENT D

REPORTS DESCRIBING Z4 WELL GROUNDWATER MONITORING DATA

ATTACHMENT D

REPORTS DESCRIBING Z4 WELL GROUNDWATER MONITORING DATA

TRW Environmental & Safety Lab, 1996. "Quarterly Groundwater Monitoring Report for October 1995, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," prepared for TRW Inc., January.

- ☐ Water level readings for wells Z4-1 through Z4-5 collected on 23 October 1995 listed in Appendix A.

TRW Environmental & Safety Lab, 1996. "Quarterly Groundwater Monitoring Report for April 1996, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," prepared for TRW Inc., May.

- ☐ February 1996 sampling event for wells Z4-1 through Z4-5 mentioned in Section 1.3 of report
- ☐ Water level readings for well Z4-3 collected on 25 March 1996 and for wells Z4-1 through Z4-5 collected on 13 May 1996 listed in Appendix A
- ☐ Laboratory report with chromium results for wells Z4-1 through Z4-5 included in Appendix B (wells Z4-1 through Z4-5 were also analyzed for volatile organic compounds [VOCs], but the data are not included in the laboratory report attached to the report).

TRW Environmental & Safety Lab, 1996. "Quarterly Groundwater Monitoring Report for July 1996, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," prepared for TRW Inc., September.

- ☐ Water level readings for wells Z4-1 through Z4-5 collected on 8 July 1996 listed in Appendix A.

Orion Environmental Inc., 1997. "Interim Status Report 1992-1996, TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 30 December.

- ☐ Section 4.1 mentions groundwater extraction wells, including Z4-1 through Z4-5, being developed and sampled at the end of 1995
- ☐ Section 4.4.1 discusses maximum VOC and chromium concentrations in samples collected from groundwater extraction wells at system start-up
- ☐ Sections 4.4.3.1 and 4.4.3.2 discuss collecting water levels from the Z4 wells to monitor drawdown and assess hydraulic capture of the extraction system
- ☐ Table 9 shows maximum VOC concentrations for wells Z4-1 through Z4-5 used as groundwater remediation system design criteria (laboratory reports with these data cannot be located)
- ☐ Table 11 shows VOC and chromium results from a 23 February 1996 sampling event conducted at system start-up

- Table 17 shows groundwater level elevation data for wells Z4-1 through Z4-5
- Figure 41 shows a hydrograph for well Z4-4.

Orion Environmental Inc., 1999. "1997 Status Report, Soil and Groundwater Remediation, Former TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 30 June.

- Table 16 shows groundwater level elevation data for wells Z4-1 through Z4-5.

Orion Environmental Inc., 1999. "1998 Status Report, Soil and Groundwater Remediation, Former TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 30 December.

- Table 15 shows groundwater level elevation data for wells Z4-1 through Z4-5.

TRW Inc., 2000. "Groundwater Monitoring Report, May 2000 Semiannual Event, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," August.

- Water level readings for wells Z4-1 through Z4-5 collected on 8 May 2000 listed in Appendix A.

Orion Environmental Inc., 2000. "1999 Status Report, Soil and Groundwater Remediation, Former TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 29 September.

- Table 14 shows groundwater level elevation data for wells Z4-1 through Z4-5.

Orion Environmental Inc., 2001. "2000 Status Report, Soil and Groundwater Remediation, Former TRW-Benchmark Site, City of Industry, California," prepared for TRW Inc., 16 July.

- Table 14 shows groundwater level elevation data for wells Z4-1 through Z4-5.

TRW Inc., 2001. "Groundwater Monitoring Report, May 2001 Semiannual Event, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," August.

- Water level readings for wells Z4-1 through Z4-5 collected on 3 May 2001 listed in Appendix A.



TRW Inc., 2002. "Annual Groundwater Monitoring and Remediation System Status Report, November 2001, Former Benchmark Technology Facility, 200 South Turnbull Canyon Road, City of Industry, California," April.

- Water level readings for wells Z4-1 through Z4-5 collected on 9 November 2001 listed in Appendix A.